

Appl. No. 10/810,309
Amdt. Dated November 29, 2006
Reply to Final Office Action of September 19, 2006

Attorney Docket No. 81716.0122
Customer No. 26021

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Canceled)
2. (Currently amended) A semiconductor apparatus comprising:
a substrate made of a diboride single crystal expressed by a chemical formula XB_2 , in which X includes at least one of Ti, Zr, Nb and Hf,
wherein an angle θ_1 formed by a normal line of a principal surface of the substrate and a normal line of a (0001) plane of the substrate is $0^\circ < \theta_1 \leq 0.55^\circ$;
a semiconductor buffer layer formed on the principal surface of the substrate and made of $(AlN)_x(GaN)_{1-x}$ ($0 < x \leq 1$); and
a nitride semiconductor layer formed on the semiconductor buffer layer, including at least one kind or plural kinds selected from among 13 group elements and As, wherein the thickness of the semiconductor buffer layer made of $(AlN)_x(GaN)_{1-x}$ is within a range of 10 to 250 nm.
3. (Canceled)
4. (Original) The semiconductor apparatus of claim 2, wherein the substrate is of ZrB_2 or TiB_2 .
5. (Canceled)

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6. (Original) The semiconductor apparatus of claim 2, wherein the substrate is a solid solution containing one or a plurality of impurity elements of 5 atom % or less, the one or a plurality of impurity elements being selected from a group consisting of Ti, Cr, Hf, V, Ta and Nb when the substrate is of ZrB_2 , or selected from a group consisting of Zr, Cr, Hf, V, Ta and Nb when the substrate is of TiB_2 .

7. (Canceled)

8. (Original) The semiconductor apparatus of claim 2, wherein the semiconductor buffer layer is AlN.

9. (Canceled)

10. (Original) The semiconductor apparatus of claim 8, wherein the thickness of the semiconductor buffer layer made of AlN is 10 to 250 nm.

11. (Original) The semiconductor apparatus of claim 2, wherein the thickness of the semiconductor buffer layer made of $(\text{AlN})_x(\text{GaN})_{1-x}$ is within a range of 10 to 100 nm.

12. (Original) The semiconductor apparatus of claim 2, wherein x of the semiconductor buffer layer made of $(\text{AlN})_x(\text{GaN})_{1-x}$ is $0.1 \leq x \leq 1$.

13. (Original) The semiconductor apparatus of claim 2, wherein x of the semiconductor buffer layer made of $(\text{AlN})_x(\text{GaN})_{1-x}$ is $0.4 \leq x \leq 0.6$.

14-18. (Canceled)

Appl. No. 10/810,309
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19. (Original) The semiconductor apparatus of claim 2, wherein the substrate is eroded and removed by etching.

20-32. (Canceled)

33. (New) A semiconductor apparatus comprising:

a substrate made of TiB_2 , wherein an angle θ_1 formed by a normal line of a principal surface of the substrate and a normal line of a (0001) plane of the substrate is $0^\circ < \theta_1 \leq 0.55^\circ$;

a semiconductor buffer layer formed on the principal surface of the substrate and made of $(\text{AlN})_x(\text{GaN})_{1-x}$ ($0 < x \leq 1$); and

a nitride semiconductor layer formed on the semiconductor buffer layer, including at least one kind or plural kinds selected from among 13 group elements and As.

34. (New) The semiconductor apparatus of claim 33, wherein the substrate is a solid solution containing one or a plurality of impurity elements of 5 atom % or less, the one or a plurality of impurity elements being selected from a group consisting of Zr, Cr, Hf, V, Ta and Nb.

35. (New) The semiconductor apparatus of claim 33 wherein the semiconductor buffer layer is AlN.

36. (New) The semiconductor apparatus of claim 35, wherein the thickness of the semiconductor buffer layer made of AlN is 10 to 250 nm.

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37. (New) The semiconductor apparatus of claim 33, wherein the thickness of the semiconductor buffer layer made of $(\text{AlN})_x(\text{GaN})_{1-x}$ is within a range of 10 to 100 nm.

38. (New) The semiconductor apparatus of claim 33, wherein x of the semiconductor buffer layer made of $(\text{AlN})_x(\text{GaN})_{1-x}$ is $0.1 \leq x \leq 1$.

39. (New) The semiconductor apparatus of claim 33, wherein x of the semiconductor buffer layer made of $(\text{AlN})_x(\text{GaN})_{1-x}$ is $0.4 \leq x \leq 0.6$.

40. (New) The semiconductor apparatus of claim 33, wherein the substrate is eroded and removed by etching.